pointedly takes to task religious groups and others who are opposed to the use of embryos in research. The portrait that Fox paints of stem-cell science and politics, and of the talented (sometimes flawed) individuals involved, is faithful to reality. She pitches her account squarely in the context of competition between individual scientists, labs and nations, not all of which have been proceeding honourably in the race to revolutionize medicine using stem cells. Few of the mainstream players are missed out. An entire chapter, 'Biopolis', is dedicated to Singapore (where I am based), which punches well above its weight in the stem-cell field. The Biopolis, a conglomeration of glamorous institutes with a world-class infrastructure, is just one of many places where Fox conducted a vast number of interviews, attended conferences and generally did her homework. The author has laboured to be thorough, and tells an interesting story.

Eve Herold's *Stem Cell Wars* is a good resource for patients and is also appropriate for lay readers. It is light on science but heavy on compassion and good sense. The bulk of Herold's discussion of the ethical and political controversies surrounding stem-cell research is confined to the United States, where policy-makers have shamelessly played into the hands of well-organized, well-funded, 'pro-life' lobbyists. Herold does a fine job of bringing to the fore the way that religiosity continues to polarize the nation with respect to all matters concerning the moral status of early human life. Herold, like Fox and Scott, dedicates pages to the stem-cell fraud perpetrated by Woo Suk Hwang in South Korea. None of the authors, it must be said, adds much that is new on the affair, which was comprehensively covered at the time by several science writers, notably *Nature*'s David Cyranowski (see, for example, *Nature* **438,** 1056–1057; 2005).

The principal themes that surface in these three books are now familiar. First, there has been a mischievous use of facts by opponents of embryonic stem-cell research. The wilful misunderstanding of important differences between adult and embryonic stem cells has skewed the moral debate and stalled progress. Second, researchers using adult and embryonic stem cells face major technical challenges, some of which may be insurmountable, and it remains doubtful whether either stem-cell type will be the medical panacea that some have proposed. Third, scientists operate in a fiercely competitive environment — reputations stand or fall on the basis of publications and the grant money required to get them. Against this background, it is unsurprising that frauds have been committed and that sloppy science has seeped into some top-tier journals. Finally, it is a fact that every day, people around the world become ill, suffer and die. Despite this, many misguided citizens seek to use governments to impose on others their own particular metaphysical conceptions of the sacredness of human life. No essentially religious view should dominate policy in a modern democratic society.

Those interested in stem cells should be mindful of what they hope to gain from their reading before cracking the spine of any of these books. Each has something to offer, but no one book is tailored for everyone. ■

Justine Burley is at the Graduate School for Integrative Sciences and Engineering, National University of Singapore, Singapore 117456, Singapore.

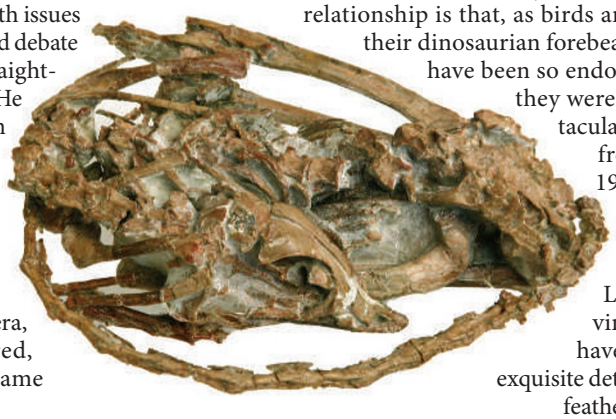
Flight of the dinosaur

Glorified Dinosaurs: The Origin and Early Evolution of Birds
by Luis Chiappe
University of New South Wales Press/John Wiley: 2007. 272 pp. Aus$59.95/£38.95, US$56

Angela Milner

Dinosaurs: you have seen them, heard them (especially in spring) and you have probably eaten them. They did not all die out 65 million years ago as a result of an asteroid impact, as the media would generally have us believe. No, dinosaurs are all around us, and there are some 10,000 living species. They are, of course, birds. As Luis Chiappe so graphically illustrates in his book *Glorified Dinosaurs*, birds are small, feathered theropod dinosaurs.

In the past decade the evolution of birds from small meat-eating dinosaurs has been established beyond all reasonable doubt, thanks to some thrilling discoveries of new fossils and the radical reinterpretation of some others known since the late nineteenth century. Here, Chiappe presents a comprehensive and up-to-date summary of the exciting research that has revolutionized our understanding of the origin and evolution of the only other group of endothermic animals beside mammals that share our planet. In a lively, readable and accessible style, he takes the reader through the historical background, stresses the evolutionary relationships and the physical and functional changes from terrestrial predatory dinosaurs through to modern airborne birds. Chiappe deals with issues of controversy and debate in a clear and straightforward manner. He also offers his own point of view on several hot topics, notably the earliest appearance of modern orders of birds in the Mesozoic era, and how powered, flapping flight came about.



M. ELLISON

The rest is history: non-avian ancestors of birds such as the troodontid *Mei long* settled in familar postures.

In the 1860s, T. H. Huxley concluded, on the limited fossil evidence then available, that birds were nothing more than glorified dinosaurs. But other views subsequently prevailed, notably that birds stemmed from early archosaurs, although there were no candidate fossils. Huxley's hypothesis was revived and really took off in the 1960s with the discovery by John Ostrom of a small, highly agile and remarkably bird-like predatory dinosaur that he named *Deinonychus*. Since then, a wealth of skeletal evidence has accumulated in support of the view that birds originated from within a group of small terrestrial theropods, now termed maniraptorans (the raptors of popular books and films). The sheer number of shared characters between maniraptorans and early birds is compelling and has formed the basis of repeated hypothesis testing by rigorous cladistic methods. The results have convinced all but the tiniest band of ornithologists.

An inevitable corollary of the dinosaur–bird relationship is that, as birds are feathered, their dinosaurian forebears must also have been so endowed. Indeed they were: some spectacular discoveries from the early 1990s onwards in Lower Cretaceous deposits in Liaoning province in China have revealed in exquisite detail a range of feathery coverings in several small theropod lineages. They range from simple filamentous protofeathers, which hint that the development of feathers was primarily for insulation, to small maniraptorans clad from head to knees in vaned contour feathers and tail plumes, just like modern birds. The remarkable preservation, which happened, like the burial of Pompeii, as a result of sudden inundation by volcanic ash and tuff, has provided the final pieces of evidence in the story of bird origins. Feathers were undoubtedly present a long way back down the theropod family tree but they are preserved only under these exceptional '*Lagerstätten*' conditions.

One of the strong points of this book is that it is profusely illustrated, in full colour throughout, with more than 220 illustrations of fossils, including many of the spectacular

Chinese 'dinobirds' and true bird fossils, and easy to follow diagrams and charts. If I have one gripe, it is that a number of the images of fossils are rather dark and do not do justice to the originals.

This book is bound to appeal not only to scientists, but also to anyone with an interest in dinosaurs, ornithology, evolution and natural history. Much of the content is available elsewhere only in the primary academic literature, so the book should prove an invaluable, compact source of information for university teachers. It is a coffee-table book rather than a textbook, but each chapter is selectively referenced, although a few more citations, particularly to some of the key Chinese specimens, would have enhanced the book's value as a reference source.

The exciting advances in this field certainly deserve to reach a wider public and professional educators, and this book does that superbly well. My attention was recently drawn to a current school textbook that stated there was little evidence to support the dinosaurian origin of birds and that they could equally well have evolved from pterosaurs. I can only hope that its author will read this book. ■

Angela Milner is associate keeper of palaeontology at the Natural History Museum, Cromwell Road, London SW7 5BD, UK.

SCIENCE IN CULTURE

Hidden talent

An exhibition in London explores the art of blending into the background.

David M. Wilkinson

Many moth species spend the day resting on tree trunks, where they can be remarkably difficult to spot. Their camouflage comprises a number of aspects, including matching the background colour (crypsis) and using disruptive patterns that make it harder to distinguish the moth's outline. Not surprisingly, such techniques have been used by the military to hide personnel and weapons. Their history is examined in an exhibition running at the Imperial War Museum in London until 18 November 2007, and in a well-illustrated book, *Camouflage* by Tim Newark (Thames & Hudson, 2007), that accompanies the exhibition.

The military turned to two main sources of expertise in developing camouflage: professional artists and biologists. Military camouflage was rarely used until the First World War, when specialist camouflage units set up by the French employed artists as 'camoufleurs'.

Artists have also contributed to the study of camouflage in nature. The American artist Abbott H. Thayer, best known for his paintings of idealized women and angels in the late nineteenth century, made several contributions to the subject, including the introduction of disruptive patterning. However, like many people with good ideas, his claims for their applications tended to be exaggerated. He famously argued, for example, that flamingos are cryptic against sunsets, whereas in reality their dark silhouettes are clearly visible. A better idea led to the painting of Second World War warships with bold disruptive designs.

Whereas Thayer believed that only artists had the necessary insight to understand camouflage, British zoologist and artist Hugh B. Cott — whose 1940 book *Adaptive Coloration in Animals* was the definitive text on animal coloration at the time — was equally convinced that science was key. Cott advised the British military on camouflage during the Second World War and was critical of the way artists dominated military camouflage. In turn, many artists and military officers considered Cott's recommendations impractical. The Germans apparently agreed with Cott's critics. While working in North Africa, Cott had fake tank shadows painted on the desert surface to fool enemy air reconnaissance. The Germans are reported to have amused themselves by dropping a fake wooden bomb on Cott's non-existent tanks.

D. E. SCHERMAN/LEE MILLER ARCHIVES, WWW.LEEMILLER.CO.UK

The ideas of crypsis and disruption are illustrated in this nude photograph of photographer Lee Miller, taken by David Scherman. Her body has been covered with 'camouflage cream' the better to match the background. The vegetation and camouflage netting is designed to partly disrupt the easily recognizable human outline — and preserve a modicum of modesty. Miller's partner, the British surrealist painter Roland Penrose, taught camouflage techniques in the Second World War and used this photograph to enliven his lectures to the British Home Guard (a volunteer homeland defence force). Penrose also wrote a short instructional book that used examples of camouflage drawn from biology.

The idea of crypsis in biology seems simple but there are complications. Imagine Miller's naked body laid out on the white sands of a coral beach. Her natural skin tones would stand out less than the dark camouflage cream used in the photograph. Any animal that closely matches the colour of one part of its environment may be restricted in other, differently coloured, places where its camouflage will fail. The evolutionary implications of this have formed part of my own research, especially regarding the conditions under which an organism should closely match one part of its environment, or when it should evolve more generalized camouflage. Moreover, disentangling the effects of disruptive patterns from simple crypsis still challenges experimentalists, as lots of organisms, including many moths, are both cryptic and disruptively patterned.

The importance of disruptive patterns has also troubled the military. After the Second World War, the British and US military largely abandoned the idea of disruptive battledress — whose value, they felt, was not supported by the evidence — for cheaper, plain uniforms. Vietnam changed this, as the experience of jungle warfare and an often well-camouflaged enemy convinced the Americans of the value of disruptive patterns.

David M. Wilkinson is in the School of Biological and Earth Sciences, Liverpool John Moores University, Liverpool L3 3AF, UK.